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possibly be a drawback to a very wide circulation. It will perhaps find its readers among a much older group of students than the writer appears to hope, judging from the popular title and the method of presentation.

As the book pleads so eloquently for more work in systematic mycology, its own success is likely to make more apparent the need of a work presenting an account of the detailed morphology, life histories, and possible relationships of the orders and families. With the advances in so many lines since the work of De Bary, the need of such a text in English cannot be too strongly emphasized.

Professor Underwood's book is a marvel in its compactness, with a wonderfully uniform tone throughout, condensed and yet very clear.—BRADLEY M. DAVIS.

### MINOR NOTICES.

M. TH. HUSNOT is indefatigable. Not content with his journal, the *Revue Bryologique*, nor with his *Muscologia Gallica*, *Hepaticologia Gallica*, and *Sphagnologia Europæa* with their 142 plates, not to mention many smaller works, nor with his *Musci Galliæ*, *Hepaticæ Galliæ*, and other exsiccatae, with their 1300 numbers, he now puts before the botanical public a quarto fascicle of almost 100 pages and 33 plates, describing and figuring the grasses, wild and cultivated, of France, Belgium, Great Britain, and Switzerland.<sup>6</sup> More than this, M. Husnot is his own draughtsman, lithographer, and publisher.

The quarto form has been adopted partly for economy and partly for the convenience of the large plates, allowing a considerable number of allied species to be drawn side by side. The letter press is double columned and compact. In substance the text is such as one finds in a manual rather than a monograph. The plates are fairly accurate, their most conspicuous defects being in some of the figures of habit. Details of the flowers are shown and keys to genera and species are given. Altogether, but for its unwieldy form, the author has produced a useful work for the botanists and cultivators of western Europe.—C. R. B.

VOLUME XX of the *Transactions* of the American Microscopical Society contains three papers of interest to bacteriologists and an elaborate study of the primary meristem of thirteen species of Caryophyllales, by Dr. F. E. Clements of the University of Nebraska. The bacteriological papers are "The persistence of bacteria in the milk ducts of the cow's udder" by A. R. Ward; "Experiments in feeding some insects with cultures of comma or cholera bacilli" by R. L. Maddox; and "Questions in regard to the diphtheria bacillus" by M. A. Veeder. An abstract of a portion of Dr. Clements'

<sup>6</sup> HUSNOT, TH.: Graminées: descriptions, figures et usages des graminées spontanées et cultivées de France, Belgique, Îles Britanniques, Suisse. 4to. pp. viii + 92. pls. 33. Cahan, par Athis (Orne): Th. Husnot. 1896-1899. 25 francs.

paper was published in this journal some time ago.<sup>7</sup> Dr. Clements has investigated the transition region from root to stem, the origin and development of radicels, and the apical growth of the stem. He describes three types in the transition region (BOT. GAZ., *l. c.*) and finds no anatomical characters of value for taxonomic purposes. Van Tieghem's conclusions that the radicels arise always and entirely from the pericycle and that there is but one type of radicellar formation in dicots are confirmed. As to apical growth, two or three initial cells are found in all the group, and Douliot's opinion that apices with two initials are more primitive while three belong to higher forms is supported. The volume is well gotten up and is a credit to the society.—C. R. B.

ONE OF THE most thorough pieces of bryological work which has yet appeared in this country is the monograph on the Hepaticæ of California which was issued in August last by Dr. Marshall A. Howe, of Columbia University.<sup>8</sup> Eighty-six species are fully described, and a number of them figured on well drawn plates. Full synonymy and remarks regarding nomenclature, differential characters, distribution, etc., provide the necessary critical apparatus for students of the group.

Dr. Howe abandons, for the first time in taxonomic work, the coordination of the Anthocerotales with the Marchantiales and Jungermanniales, and raises them to the rank of a class of the Bryophyta coordinate with the Hepaticæ and Musci. While perhaps not entitled to speak on this point, we incline to a less radical step, such as dividing the Hepaticæ into two sub-classes, Eu-hepaticæ and Anthocerotes.

The descriptions are long, seldom less than half a page, and do not indicate the diagnostic characters; a lack which is partly supplied by the keys to species, when more than one occurs in the region, and partly by supplementary remarks. The modern morphological terms occasionally replace the conventional ones, but there is, unfortunately no consistency in this usage, sporophyte and sporogonium and capsule, receptacle and gametophore, thallus and plant being used without apparent system. The plates are quite unlike the ordinary taxonomic ones, giving many morphological details, as do the descriptions. The monograph therefore will be welcomed by both bryologists and morphologists.—C. R. B.

THOSE who have used Professor Macbride's monograph on the Myxomycetes of eastern Iowa will welcome the more extensive account furnished by the present volume which gives descriptions of all species of Myxomycetes hitherto described from North America including Central America.<sup>9</sup> An introductory

<sup>7</sup> BOT. GAZ. 24: 182. 1897.

<sup>8</sup> HOWE, M. A.: The Hepaticæ and Anthocerotes of California. Memoirs of the Torrey Botanical Club 7: 1-208. *pl.* 88-122. 5 Aug. 1899.

<sup>9</sup> MACBRIDE, THOS. H.: The North American slime molds. 8vo. pp. xvii+269; *pl.* 18. New York: The Macmillan Company. 1899. \$2.25.

chapter gives a description of the habit, habitat and life history of the group, and a discussion of the nomenclature. Directions are given for collecting and preserving specimens.

The æthalioid forms are regarded as the most primitive, while the isolated sporangium with its capillitium is the highest expression of myxomycetous fructification, reached by successive differentiations from the simple plasmodium. The artificial keys follow this sequence. As in the previous monograph, the keys are clear and the descriptions are accompanied by a full synonymy. The plates are well drawn and should readily enable the student to recognize in actual preparations the structures which the figures are intended to illustrate.—CHARLES J. CHAMBERLAIN.

IN examining garden soils near Cambridge University (England) Dr. W. C. Sturgis isolated and studied a large soil bacillus of the type of De Bary's *B. Megatherium*. Of its peculiar life history and morphology he gives an extended account in Phil. Trans. Roy. Soc. London B. 191: 147-169. *pl.* 14-16. 1899.

LIEFERUNGEN 4 and 5, completing the second edition of the *Flora* of the northeast German Lowlands, have been published.<sup>10</sup>

Nothing need be added to the notice of the earlier parts.<sup>11</sup> The general form and the details of typography are admirable for a field manual. It was announced that the price for the complete work would be raised above the subscription price of *M* 16.50, already high.—C. R. B.

### NOTES FOR STUDENTS.

IN THE *Transactions* of the Royal Society of London (B. 190: 531-621) Mr. Francis Darwin has published the results of interesting investigations on the behavior of stomata. He departs somewhat from the methods of previous investigators, which he does not consider very reliable, and uses the hygroscope method suggested by him some years ago. He has improved upon the stipa hygroscope, using now hygrosopes made of horn shavings and strips of the dried epidermis of *Yucca aloifolia*, so attached to a bit of cardboard bearing graduations that the degree of curvature induced by the moisture from open stomata can be read. The horn hygroscope is quite reliable and has the advantage of showing in a few seconds whether the stomata are open or closed, while the *Yucca* hygroscope can be used to study accumulating moisture. His results frequently differ from those of previous investigators.

<sup>10</sup> ASCHERSON, P., and GRÆBNER, P.: *Flora des Nordostdeutschen Flachlandes* (ausser Ostpreussen). Zweite Auflage. Lieferungen 4, 5. 12mo. pp. 481-875. Berlin: Gebrüder Borntraeger 1898. *M* 7.80.

<sup>11</sup> BOT. GAZ. 26: 363. 1898.